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FLEXIBLE RESPONSE AND GENERAL PURPOSE FORCES, 1961-1964

During the two terms of the Eisenhower administration, America's world military position had suffered a number of severe challenges. The unexpectedly early Soviet detonations of atomic and hydrogen weapons and the shock of Sputnik created the fear that the Soviet Union was overtaking, and perhaps surpassing, the United States in military power. Confronted by an enemy apparently capable of a wide variety of tactics for expansion, many Americans felt that our military doctrines and forces were inadequate and that our national military policy needed major revision. The elections of 1960 brought into office a new president who called for another new look at the military problems that faced the country, and the "thousand days" of his administration and the months thereafter brought not only a thorough reevaluation of the questions of national security, but also a fundamental reorientation of America's military posture.

Criticism of the Eisenhower defense policy, particularly the policy of massive retaliation, surfaced first in academic circles.¹ The critics maintained that the threat of massive nuclear destruction in response to any level of communist aggression was clearly unbelievable, and thus Eisenhower's heavy reliance on strategic nuclear power left the United States virtually defenseless before the gradual encroachments and subtle aggressions that seemed to have become the staple of the Russian program for expansion. For many of the critics, the policy of massive retaliation had only been credible during America's period of clear strategic superiority. Now with that superiority challenged and perhaps even eliminated, the threat of massive retaliation appeared to be an open invitation to nuclear holocaust.

Some critics feared that the rapid technical developments in both weaponry and delivery vehicles during the 1950s could make the United States actually inferior to the Soviet Union. In his famous article published in 1959, Albert Wohlstetter questioned the ability of the United States to respond to a Soviet surprise attack.² Possessing a powerful nuclear deterrent was no longer enough; that deterrent also had to be able to survive a first strike and then retaliate against the aggressor. American strategic bombers and missiles in overseas bases were dangerously exposed to Russian attack, and even when these weapons could be moved back to the United States, the new Soviet ICBMs and long-range bombers placed them in jeopardy. Survivability thus became another criterion of national security.

National defense emerged as an important political issue in the campaign of 1960, when the Democratic challenger, Senator John F. Kennedy, raised the issue in the debate over the missile gap. The launching of Sputnik in 1957 and the confused intelligence estimates about the number of Soviet ICBMs led to widespread fears that the United States was behind the Russians in the missile race. Whether real or imagined, the "missile gap" was the most explosive issue in a more fundamental Democratic attack on the Eisenhower defense policy. Because strategic nuclear weapons were no longer a credible deterrent to Soviet expansion, the United States needed to develop a broad range of military options that could contain communist aggression in any form. Borrowing the phrase from General Maxwell Taylor, Kennedy argued that America needed a "flexible response" that gave the United States a greater range of options than the choice between nuclear destruction or defeat.³

In order to obtain this ability to respond flexibly, America had to shape its forces to fit the nature of the Soviet challenge and not some arbitrary budget ceiling imposed by the President. According to the Democrats, America's military weakness was due not only to an excessive reliance on inadequate strategic weapons, but also to the failure to spend money that could well be afforded on the broad range of nonnuclear forces that could respond more effectively to the new and more insidious communist threat.

The Democratic emphasis on the dangers posed by limited wars and insurgency, or "wars of national liberation," harmonized with the views of long-time critics of the Eisenhower policies within the military, especially the Army. Two Army Chiefs of Staff during the 1950s, Matthew Ridgway and Maxwell Taylor, had resigned at least partially in frustration at seeing the Army relegated to a distinctly secondary position within the military establishment, and Taylor's subsequent criticism of the Eisenhower policy had influenced Senator Kennedy.⁴ Although none of the military services anticipated the sweeping changes that the new Kennedy administration would enact, the Army welcomed the new President's emphasis on balanced forces and an expanded role for land forces.⁵

When President Kennedy came into office in January 1961, the man he chose to direct the reexamination of the entire defense establishment was Robert S. McNamara, president of the Ford Motor Company. Soon after taking office, Kennedy and McNamara adopted a number of "quick fixes" to strengthen the strategic retaliatory forces and make them less vulnerable. But their long-range program involved substantial increases in the defense budget and, in particular, large increases in expenditures for nonnuclear forces. The flexible response doctrine called for an Army that could deal with an array of nonnuclear conflicts ranging from a limited war in Europe to counterinsurgency in the underdeveloped world. The new administration increased the size of the Army and spent large sums of money on moderniz-

ing equipment and improving training, including intensive training for units like the Special Forces. Emerging from its “Babylonian Captivity,” the Army found itself once again with an important conventional, as well as nuclear, role in the new “balanced forces” that the Kennedy administration began to construct.⁶

Although the Army stood to gain substantially from the new defense policy, the first months of the McNamara era were an unsettling time for the entire Department of Defense. While the new administration removed the budget ceilings of the Eisenhower era, the new Secretary of Defense intended to play an active role in making decisions about how the money was spent, and he was determined to spend it effectively. Turning his keen and critical managerial eye upon the department, McNamara discovered what he considered to be a plethora of inefficient and unbusinesslike practices within the Defense Department and set out to correct them.⁷ The arrival of the new Secretary was a mixed blessing, even for the Army.

Among the most unquiet elements within the Army were the technical services, which had come under attack many times in the 20th century as anomalous survivors of an earlier age. In the summer of 1961, rumors of a major reorganization in the Defense Department floated through Washington, and the Strategic Planning Group (SPG) responded by holding a “brainstorming” session on *The Dilemma of the Corps of Engineers on the New Frontier*.⁸ The briefing presented to the Chief of Engineers, Lieutenant General Walter K. Wilson, Jr., did not dodge the critical problems: “Other parts of the Army, of DOD, of the Federal Government would like to restrict our activities.” According to the briefing, the Corps needed to become a more dynamic, efficient, and imaginative organization: “Our bureaucracy moves too slowly. Our customers are not happy. Our public image is not the best.”⁹ The briefing proposed that the Corps adopt a more efficient, decentralized management structure and actively pursue new missions in the space program and in counterinsurgency warfare. Above all the Corps needed to strive for an active combat role and avoid being subsumed in the logistical functions of the Army. The SPG concluded that the dilemma of the Corps was serious indeed:

General Wilson, it will be a long and bloody fight to reverse the trend of lessened missions and lessened respect that you have inherited. We think the trend can be reversed, and must be reversed. If we don’t move fast and obtain the active support of the New Frontier, before long our status may be analogous to that of the engineers in the Marine Corps.¹⁰

The fears of the technical services were realized in 1961 when Secretary McNamara directed the Army to conduct a thorough study of its organization and functioning. As a result of the Hoelscher committee and Project 80 recommendations, five of the seven technical services were “functionalized”—the separate corps were abolished and their activities

assigned to the Army staff or specialized commands. In this major and traumatic reorganization only the Chief of Engineers and the Surgeon General survived, and even then their personnel and training functions were assigned to new agencies.¹¹

Although the survival of the Corps of Engineers was due to many reasons, General Wilson gave the SPG, later called the Engineer Strategic Studies Group, part of the credit:

I really think what happened to save us was to a large extent our capabilities. One capability you would not necessarily think about. About that time things began to get hot in Vietnam, and there were requirements for better intelligence and better analysis. I do not remember how we first got in it, but at some meeting we went to, there was a point made that we needed to have a quick study and where can we get it done promptly. I think I spoke up and said, "I can get it done for you in our Strategic Studies Group." They said, "What are they?" I started explaining. They asked, "You have one of those?" I said, "yes, we have one of those." They wanted to know where we had it, and I told them it was out at the Map Service. "Why do you have it?" they asked. I said, "We have it for the Chief of Engineers to have the capability to make recommendations to the Chief of Staff and support the military plans of the Army, if the opportunity offers." So they said, "Get us one." We had a recommendation and backup in about three days and it hit just right. About that time the Chief of Staff said, in essence, "I want Wilson at all our staff meetings considering Vietnam because he's got this tool we can use and we need him." So I suddenly began getting invited to the senior staff meetings of one kind and another which we had not been doing for a long time. We kept using the Strategic Studies Group as a key to unlocking some of these things. And they did a beautiful job. There was no place in the whole Army, intelligence and all, that had the balanced, cohesive group pulled together with a capability like we had.¹²

General Wilson accepted the reorganization, albeit grudgingly, and worked actively to provide support to the Army staff: "We got way down in size, but we still kept that Strategic Studies Group out at the Map Service and we used them frequently. We still kept just a little bit of capability to go speak on the tactical side to the Army. Within another six or eight months, that was becoming more important. And the first thing you know, we began to rebuild a stronger capability."¹³ The Corps of Engineers weathered the challenge of the New Frontier better than most of the other technical services, but there was little room for complacency. The new McNamara regime was a demanding one, and in addition to its penchant for reorganization, it required a constant stream of studies and analyses from the armed services to justify old programs and explain new ones.

The broad rubric under which McNamara and his "whiz kids" ap-

proached defense problems was called "systems analysis." Although the term soon came to symbolize much more than a method for tackling complex problems, its proponents defined it very simply: "Systems analysis is a reasoned approach to highly complicated problems of choice in a context characterized by much uncertainty."¹⁴ According to Alain Enthoven and K. Wayne Smith, both former members of McNamara's staff,

the term itself emphasizes two basic aspects of thinking about defense problems. First, the word "systems" indicates that every decision should be considered in as broad a context as necessary. In most cases, decisions deal with elements that are parts of a larger universe, or system. The word "analysis" emphasizes the need to reduce a complex problem to its component parts for better understanding. Systems analysis takes a complex problem and sorts out the tangle of significant factors so that each can be studied by the method most appropriate to it. Questions of fact can be tested against the available factual evidence; logical propositions can be tested logically; matters of value and uncertainty can be exposed and clarified so that decisionmakers can know exactly where to apply their judgment.¹⁵

Although the method itself was not new, as its proponents admitted, the term had come from the Air Force's think tank, the Rand Corporation, and it soon became a standard of Pentagon studies and analyses.¹⁶

Most of the SPG studies from the Eisenhower era already conformed to the new model of systems analysis: thus the organization, unlike other parts of the Army, did not have such great difficulty in satisfying McNamara's demands.¹⁷ The group's studies after 1961 did, however, show a greater concern with costs, because cost-effectiveness was also a preoccupation of the McNamara era: "What is worth doing depends in large part on how much it costs."¹⁸ In some earlier studies, such as Project Iceworm, SPG had considered costs in a rudimentary fashion, but cost analyses became more standard and more sophisticated during the Kennedy years. In 1961 the Army found itself with only a limited study capability, and a variety of agencies turned readily to an organization like SPG that could help them satisfy the new administration's seemingly insatiable appetite for studies.

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Although President Kennedy placed great emphasis on increasing nonnuclear forces, the administration also committed itself to correct what it saw as deficiencies in the Eisenhower strategic nuclear policy. Even though the missile gap turned out to be illusory, McNamara still pushed ahead programs to reduce the vulnerability of bombers and missiles and to improve the security of the command, control, and communications systems. The administration quickly jettisoned the doctrine of massive retaliation but found the job of replacing it difficult. In a speech delivered

in Ann Arbor, Michigan, in June 1962, McNamara announced that the United States would follow a counterforce policy that would spare Soviet cities, at least initially, and instead respond to a Russian first strike by attacking Soviet military capabilities. Defense analysts and our NATO allies quickly discovered flaws in the new policy, and the Secretary found himself embroiled in the debate over strategic nuclear policy that had been raging both outside of and within the Defense Department throughout the late 1950s.¹⁹

Although McNamara gradually backed away from the counterforce doctrine, only in the mid-1960s did he articulate the alternative strategy of mutual assured destruction that would remain the official American position for almost two decades. Because the overriding aim of nuclear strategy was to deter nuclear war, the new doctrine threatened to retaliate to a Russian first strike by destroying a large proportion of Soviet industry and population. The only result of nuclear war then would be such devastation that neither side could hope to gain by starting a war.²⁰

Although SPG had anticipated this strategy as early as 1959, the group continued to search for alternatives that would expand America's options and avoid the specter of a nuclear war that, no matter what the cause, would result in global devastation. A study published in May 1961, a year prior to McNamara's Ann Arbor speech, brought together several themes in SPG's thinking about strategic warfare and illustrated the tone and direction of the group's strategic nuclear work in the early 1960s.²¹ Prepared for a special study group established by the Chief of Staff of the Army, the study's purpose was "to develop a feasible strategic concept for general thermonuclear war and consider the military posture required to support the concept."²² This study was one of SPG's most comprehensive analyses of America's strategic nuclear doctrine and its problems.

General War Strategy and Posture began with a critique of massive retaliation—a critique that had become common in the late 1950s. Current strategy "would commit the United States to a single, inflexible, all-out response to a general war. It would not offer opportunities for an acceptable cease-fire short of all-out destruction."²³ Although this strategy might have been appropriate as an instrument of coercion during the period when the United States had a nuclear monopoly, it was now ineffective because the Soviet Union possessed both an atomic arsenal and the means of delivering an attack on the United States. The American strategic posture was also weakened by the vulnerability of American missiles and bombers to surprise Soviet attack—a vulnerability that in SPG's opinion tended "to invite, rather than deter, general war."²⁴ Bombers on the ground or the exposed, liquid-fueled first generation of American missiles were prime targets for a preemptive first strike. Another weakness was the vulnerability of the American command, control, and communications system, which a Soviet attack could seriously disrupt, causing doubt about the effectiveness of an

American strategic response. And, finally, even if American missiles were launched, their reliability was unknown and their accuracy, as SPG had pointed out in 1960, was low.²⁵ All of these factors made American reliance on the threat of massive retaliation an outmoded and seriously flawed strategy.

Other nuclear strategies had been proposed as alternatives to massive retaliation, and the SPG study singled out two of these for comment. The strategy of finite deterrence “proposes to deter general war by threatening the destruction of enemy cities with a limited, finite number of invulnerable strike-second nuclear weapons, and to build up conventional forces that can cope with limited aggression.”²⁶ In the mid-1950s the Navy had adopted finite deterrence as its preferred nuclear strategy, and some Army officers also favored this concept.²⁷ According to SPG, however, a finite or minimum deterrent might well allow the Soviets to gain such a substantial nuclear weapons’ superiority over America that the Russians would be willing to accept the limited losses inflicted on Soviet society in exchange for the massive destruction, and perhaps victory, it could obtain over the United States. With such a marked superiority, the Russians also might be willing to risk limited or indirect aggressions without fearing retaliation from the weaker American nuclear arsenal.²⁸

Another alternative strategy was the counterforce doctrine that McNamara espoused in his Ann Arbor speech, but SPG found it unacceptable as well. The counterforce strategy “attempts to eliminate the basic flaw—a credible enemy counterthreat—in the Massive Retaliation concept by concentrating our attacks on enemy nuclear forces. Counterforce apparently clings to the idea of extending the deterrent value of long-range forces to deter lesser provocations.”²⁹ According to SPG, the basic problem with counterforce was the technical one that had been outlined in the *ICBM Duel* study.³⁰ “The enemy is not likely to fear a disarming attack as a U.S. response to limited aggression. He, too, can war game a nuclear exchange and determine that ICBMs would be relatively ineffective in a counterbattery role against hardened ICBMs (even if their location is known).”³¹ As the 1960 study indicated, counterforce required intelligence about the precise location of Soviet missiles and American missiles accurate enough to destroy hardened ICBM sites, both of which were lacking in 1961.

Although both finite deterrence and counterforce were inadequate doctrines, the group felt that they did try to correct certain weaknesses in the concept of massive retaliation: “Implicit in these strategies is recognition of three facts: the United States is now vulnerable to sudden attack; our salvation lies in having the capability and the will to neutralize or destroy any enemy inclined to exploit this vulnerability; and our national values require us to develop a force capable of doing its work even after absorbing an enemy first blow.”³² All of these facts became elements in the nuclear

strategic planning of the Kennedy administration. Yet according to SPG, both finite deterrence and counterforce, like massive retaliation, were inflexible strategies that contemplated one basic course of action: "Counterforce relies on the doubtful goal of destroying enemy weapons while Finite Deterrence offers no alternative to the destruction of cities."³³ In this statement, the study summarized two of the major conclusions that had emerged from SPG's nuclear studies during the Eisenhower era. The group's doubts about the efficacy of attacking ICBMs with ICBMs and the effectiveness of striking population as a primary target persisted during the early 1960s and led SPG in many of its studies to search for more meaningful targets for the nation's rapidly growing nuclear arsenal.

After rejecting three nuclear strategies, the SPG study formulated another alternative, called "controlled initiative," which would "respond to threat, aggression, or accident with flexible, measured, deliberate actions that would tend to take the initiative from the enemy, conserve U.S. power, limit damage and limit the danger of escalation."³⁴ Based on its studies of the vulnerability of the United States and the Soviet Union to nuclear attack, SPG concluded that nuclear war would not necessarily end in a single massive cataclysm but instead might continue for an extended period of time. In this war there should be three goals: defend the United States, defend Europe, and continue the war.³⁵ Each goal required its own set of strategic targets that would be attacked according to the dictates of the evolving military situation:

The target systems to be struck are selected, by category and geographic area, for their effect on those enemy capabilities that we wish, at that moment, to control. Such a targeting concept depends upon having offensive forces that can survive enemy attacks, a command net that can voice the will of the commander, and flexible force application involving timely retargeting and reprogramming. The targeting concept presents to the Commander-in-Chief many options from which he may choose in fighting general war. Ideally in time sequence and to the extent feasible, he would be able to disarm the enemy strategically, disarm him tactically, paralyze his economy, destroy his economy and incapacitate his population.³⁶

According to SPG, its target system was superior because "it goes beyond the limits of pure counterforce or counter-city concepts to provide optimum support for all our general war tasks."³⁷

In order to execute a strategy of controlled initiative, the United States needed balanced forces: "We are led then to a conclusion that we need a balanced force concept that includes, in addition to long-range forces, active and passive defense systems in the United States, strong NATO forces and a survivable command and control system."³⁸ Although the United States needed adequate long-range forces, there was a danger that too many ICBMs and bombers might be built at the expense of theater

missile forces and antiballistic missiles (ABMs). The combination of a variety of offensive and defensive forces and measures would add to the complexity of Soviet defense problems and increase the number of options available to the United States.³⁹ Thus the SPG strategy would strengthen deterrence and if deterrence failed, provide a flexible and rational plan for responding to a first strike and prosecuting the war to a successful conclusion. Although the strategy of controlled initiative had its own flaws, it was the group's attempt to steer a middle course between competing strategies, especially the two that characterized the strategic nuclear debates of the early 1960s—counterforce and counter-city. According to SPG, counterforce was technically infeasible and counter-city was unnecessary, perhaps even unproductive.

Since the controlled initiative strategy assumed that a general war would continue beyond the first strategic nuclear exchange and that one important goal in this war was the defense of Europe, SPG felt that the strategic nuclear strike plans should include targets that would assist the Army in halting the advance of Warsaw Pact forces. In two studies completed in 1961, the group examined the Single Integrated Operations Plan (SIOP), which had succeeded the atomic annexes, and demonstrated that the attacks in SIOP would have only limited effect on the survival of the Soviet army if Soviet commanders took simple measures to protect the safety of their troops.⁴⁰ Many of the people who heard the briefings of the first study were skeptical because, according to SPG, they were "handicapped by the dangerous notion that the thermonuclear exchange will somehow neutralize the Soviet Army."⁴¹ Hence, the group did a second study later in the year. Both studies concluded that "U.S. preoccupation with the thermonuclear exchange tends to overlook the possibility that the defense (or loss) of Europe could be decisive,"⁴² and thus SIOP should place greater emphasis on measures to help NATO defend Western Europe from Russian invasion.

SPG proposed a retardation or interdiction doctrine that would allow theater and subordinate commanders to develop plans to slow or halt the movement of the mobilized Russian army through the satellites into Western Europe by destroying transportation facilities. Although the concept of retardation had appeared early in post-World War II strategic planning, SPG felt it had been neglected in the strategic plans of the early 1960s. The new interdiction doctrine followed the same logic as the barrier planning that the organization had been doing since 1950: "It seems clear that the use of natural obstacles tied together into barrier lines should apply to interdiction as well as to barrier planning, since interdiction has the same general purpose in the enemy rear as normal barriers to his front. This is our first principle in the new interdiction doctrine."⁴³ Both studies then proposed a detailed list of targets that, when destroyed by nuclear weapons, would reinforce a series of natural barriers to hinder the move-

ment of forces and supplies from the Soviet Union across Central Europe and serve to counter NATO's numerical inferiority to the Warsaw Pact.

Apparently, the retardation analyses completed in 1961 had little effect. Two years later the group published two more studies that again stressed the importance of restricting Soviet army movement.⁴⁴ SPG admitted that interdiction was difficult because of the large number of factors that had to be taken into account. The calculations depended on such factors as the amount of warning time Soviet troops would have, the nature of the American attack, wind conditions during the attacks, and the large number of access routes provided by the extensive road and railroad network in Central Europe: "In no manner does the study which follows completely overcome these complexities. Rather, by simplification, assumption and judgment, the various problems were codified until they could be managed in a hand calculated map exercise."⁴⁵ The map measured 12 feet by 30 feet, and after careful and painstaking calculations, SPG concluded again that the United States could implement an effective interdiction system. This series of four studies did result finally in some revisions in American strategic nuclear targeting.⁴⁶ SPG had helped the Army identify and justify targets that were important in the Army's primary role as defender of Western Europe.

Although in the early 1960s SPG reviewed the SIOP primarily to identify targets for the Army, some studies closely resembled its critiques of the atomic annexes of the 1950s. In 1964 the group completed two short studies that examined how well the American Unified and Specified Commanders and the Supreme Allied Commander, Europe (SACEUR) conformed to the constraint guidelines formulated to minimize damage to non-target urban areas and populations.⁴⁷ These studies included recommended measures to improve adherence to the constraints.

In two other studies published in 1964, the group also pursued another theme that had appeared during the Eisenhower era. In a detailed review of a proposed new manned strategic bomber, SPG pointed out a number of the aircraft's shortcomings, but the group held to its basic premise, articulated in the 1950s, that "the primary role of aircraft (in the 1970s) should be to supplement ballistic missile targeting by providing a means of achieving objectives otherwise unattainable except with undesirable side-effects."⁴⁸ The study concluded that the proposed aircraft should be more closely tailored to these supplementary missions. The second study examined the effects of the blinding light from initial nuclear explosions on bombers that were still approaching their targets and reached a very simple recommendation—replace the bombers with medium-range missiles. SPG's vision of the future still saw missiles supplanting bombers.⁴⁹

Although the debate over nuclear strategy persisted until the mid-1960s when the preoccupation with Vietnam pushed it into the

background, SPG continued to search for an alternative strategy that was technically practical and strategically sound. In both massive retaliation and mutual assured destruction, the group saw strategies that treated nuclear war as a massive, ungovernable cataclysm that defied both control and analysis. If strategic nuclear war remained a possibility, in spite of deterrence, then the United States needed to search for more flexible and controlled options that allowed the war to be fought with objectives beyond simply massive destruction. The objectives should include traditional principles, such as defending Europe, and targeting designed to impede the Soviet army. By refusing to analyze general war beyond the initial phase of nuclear destruction, SPG felt that American strategy was unnecessarily restricted in its options and dangerously unprepared for a remote but conceivable eventuality.

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Closely related to the studies of strategic nuclear warfare was the investigation of nuclear weapons effects or vulnerability analysis. Without an understanding of the various effects of nuclear explosions and the susceptibility of targets to those effects, determining the enemy targets to attack or the American targets to defend would be difficult. That SPG became involved in vulnerability analysis logically followed its strategic and tactical nuclear work. The topic was particularly important in the Kennedy era when it was considered likely that the United States would be struck first in a nuclear war, and survivability became a significant aspect of national defense. Although SPG had studied the effects of nuclear weapons during the Eisenhower era, vulnerability analysis became a distinct and more prominent field in the early 1960s. In one of the first such studies during the Kennedy administration, the group continued to probe a topic that had concerned it earlier—the massive destruction of the Soviet civilian population that seemed implicit in American nuclear strategy.

The target category that led to this destruction was labeled “urban-industrial,” but whether the objective was to destroy war-related industries located in cities or civilian urban population was unclear. According to Henry Rowen, one of McNamara’s “whiz kids,” “the linking of ‘urban’ to ‘industrial’ targets in the hyphenated phrase ‘urban-industrial’ does not follow from the laws of physics but from a combination of doctrine and technology specific to a given era.”⁵⁰ The inaccuracy of early ballistic missiles and the high yields of nuclear weapons in the early 1960s made distinguishing urban from industrial targets difficult. Only in the late 1970s did new nuclear targeting policies provide “an option for attack on urban targets, but with emphasis on targeting selected war-related industrial facilities, not on widespread damage to population.”⁵¹ Although the option of distinguishing urban from industrial targets has only entered American

strategy in the last few years, SPG anticipated and evaluated this option almost two decades earlier in May 1961.

In the starkly entitled study, *What Kills a City?*, the group asked, “What is the best targeting philosophy for choosing those strategic targets that achieve economic neutralization of the U.S.S.R.?”⁵² The two conclusions of the SPG analysis were as simply stated as the question in the title:

1. Simply killing large fractions of a city’s population does not restrict the activities of the survivors just to an effort to stay alive; the survivors are not necessarily reduced to raw survival standards.
2. The capacities of community, or of an area, for reconstruction, or for export, are damaged to a greater extent by targeting industry than by targeting population.⁵³

Using three Soviet urban areas as test cases, SPG calculated the effects of two nuclear attacks, one maximizing civilian casualties and the other maximizing the destruction of the industrial plant. An input-output economic analysis of the sample cases revealed that “the single most critical factor in the post-strike economy is not labor. Even in the cases in which the weapon is placed so as to maximize casualties, the first shortage to be observed is in plant or capital equipment.”⁵⁴ Throughout the 1950s and even later, many analysts treated the destruction of population as a “bonus.” If the purpose, however, was to continue the war and achieve some sort of victory, then targeting population was not a bonus, but in fact was a liability because it did not effectively hamper Soviet industrial production. The conclusions of *What Kills a City?* ran counter to one of the most persistent and often dominant targeting philosophies of American strategic nuclear thought.

The methodology used in this study was as important as its conclusions, because the group followed this method in a series of nuclear vulnerability studies completed during the McNamara era. The purpose of vulnerability analysis was to calculate the effects of a given nuclear attack on an entity—a nation, a city, a military force, or a military base—and to determine the ability of that entity to function after the attack. A study published in 1962 explained the logic of vulnerability analysis: “In any vulnerability analysis, two results are desired: an assessment of the damage sustained by the target system; and an assessment of the post-attack capability of the remaining forces and installations.”⁵⁵ In damage assessment the first step was collecting the data that allowed analysts to determine the vulnerability of the targets to nuclear explosions: “Targets are defined as ‘soft’ or ‘hard,’ vulnerable or invulnerable, based on their relative ability to resist or avoid damage.”⁵⁶ Next the analysts projected the likely weapons and targets of an enemy nuclear attack based on intelligence data and estimates of enemy intentions. In the early 1960s, computer programs that calculated the damage from an attack were becoming available, but SPG still often used a complex map exercise performed by hand either to supple-

ment or verify the computer analyses. Damage assessment was a complicated process, matching the vulnerability factors of a target with the yields, accuracy, and probabilities of the arrival of various enemy delivery vehicles.⁵⁷

While the first step in vulnerability analysis, damage assessment, was capable of precise calculation, SPG acknowledged that the second step, assessment of post-attack capability, was “an adventurous pastime.”⁵⁸ It was difficult because “the real answer to [a target system’s] residual capability is influenced more by people than by things. It is only by assuming that people will strive to make the best of a very bad situation that any posture results.”⁵⁹ Civilian or military organizations are composed “of many interrelated sub-systems and the net functioning of the whole system depends on a very complex relationship among the sub-systems. The estimates of post-attack capabilities, therefore, are more a matter of judgment as compared to damage assessments which are based upon quantitative calculations.”⁶⁰ Vulnerability analysis was a very complex procedure, but it was critically important to any military planning for nuclear war.

The Strategic Planning Group’s first comprehensive vulnerability study was PAMUSA-63 (Post-Attack Mobilization of the United States Army). The Chief of Staff of the Army formed a committee called the Post-Attack Mobilization Ad Hoc Committee in July 1960 and asked it “to determine the capability of the Army to mobilize, deploy, and support forces in combat following a thermonuclear attack of the CONUS.”⁶¹ In August 1960, SPG formed a special Vulnerability Analysis Division of six people to supervise and support the ad hoc committee, which was composed of representatives from several General Staff agencies, the technical services, and the Continental Army Command.⁶² Under SPG direction, this large committee published a five-volume study in July 1961.

At first glance the Chief of Staff’s directive might seem relatively simple, but in fact the ability of the Army to mobilize and fight in Europe after a thermonuclear attack depended on the ability of the entire nation to recover from a massive attack:

The central and complex problem of PAMUSA-63 is “How many division forces can the Army mobilize, deploy, and support in combat for the two-year period following a thermonuclear attack on CONUS in mid-1963?” It is not enough to just look at the residual Army, its residual units, personnel, stocks of equipment and what is left of the Army production base. The whole CONUS post-attack situation must be examined. There are other demands which must be considered, demands of the other services, and those of the civilian population that may survive and return as quickly as possible to productive pursuits in support of the war effort.⁶³

Some of the methodological tools for performing this complex analysis were already available, but the task was so broad and new that SPG and other agencies had to develop new computer programs to perform certain analyses.

Among the group's contributions was the technique for examining the recovery of sample cities that had first been applied in *What Kills a City?* The heart of the technique was an econometric input-output model, which assumed that a city (including its surrounding region) was both a producer and a consumer. After an attack, a city would devote its remaining resources first to recovery. If its own resource base remained large enough and if it could receive "imports" from other regions, then a city might also produce a surplus that could be "exported" to other regions. The volume of these "exports" and surpluses would be critical elements in determining the activities, beyond recovery, that the post-attack economy could support. SPG decided that this technique was important enough to be the subject of a separate volume of the study:⁶⁴

Since studies which deal with the total national economy run a risk in ignoring the details of a post-attack environment at the local day-to-day level, it was decided in PAMUSA-63 to inquire into the survival/resource allocation problems of two metropolitan areas—St. Louis and Boston. In essence, each city recovery study consists in asking: "Can the city survive? Can it support its survivors over time? How soon can the city then make a net contribution to the national economy? When can it export goods to other areas of the country?"⁶⁵

As in the case of other SPG studies, the questions asked and the problems to be solved required not only rigorous analysis but also the development of new tools and methodologies.

After almost a year of work, SPG felt that "PAMUSA-63 is a fairly complete synthesis of the physical ability of the nation to pull itself out of the ashes and continue the war."⁶⁶ Although the study arrived at a long list of both general and specific conclusions, its overall findings were simply stated: "In summary, there are two principal conclusions of the PAMUSA-63 study: (a) If the nation as a whole wants to survive, it can survive a severe attack. (b) NATO can be reinforced following a thermonuclear attack in the 1963 time frame."⁶⁷ The study recommended a series of measures to minimize the effects of the attack including deployment of the Nike-Zeus antiballistic missile, a viable and active civil defense program that would include extensive efforts at public education, larger stockpiles of certain resources and equipment, and measures to reduce the vulnerability of both civilian and military targets. In its examination of the post-attack recovery of sample cities, SPG's conclusions were perhaps more optimistic than might have been expected:

Provided that certain minimum preparations are taken, it is concluded that both St. Louis and Boston can survive the short

run with little or no help from other cities, and that they can recover as organized industrial cities, making a net contribution to the national economy. In St. Louis, the latter point is reached about ten days after the attack; in Boston, about 50 days after the attack.⁶⁸

Although the group admitted that there was some "untidiness" in the study, it was a major, comprehensive Army attempt to evaluate the effects of a massive nuclear attack on the United States and the ability of the nation to recover and continue the war.

In 1962 and 1963, SPG conducted other vulnerability analyses using many of the techniques of the PAMUSA-63 study. The most extensive of these studied the capabilities of NATO following a nuclear attack.⁶⁹ The group's effort was part of a larger study ordered by the Secretary of Defense and coordinated by a JCS Special Study Group. Earlier in 1962, SPG had already published an analysis of the vulnerability of NATO's theater missiles. Both studies uncovered deficiencies in the NATO posture.⁷⁰

The most serious problem, according to SPG, was the vulnerability of NATO's fixed, unhardened military installations, in general, and land-based missile systems, in particular, to Soviet nuclear attack. The most common recommendations for improving the survivability of military forces were "hardening, mobility, dispersion, and deception."⁷¹ In the early 1960s the Kennedy administration relied heavily on hardening, which was the protective measure for the new Minuteman missiles destined to be an important part of America's strategic retaliatory force. Although hardening was an effective measure in an era when missile reliability was questionable and missile accuracy poor, SPG looked beyond this transitional period: "The most effective vulnerability reduction measure in Europe is the combination of dispersal with mobility. The latter implies both the ability to move and adherence to the practice of moving often enough to negate the enemy target acquisition. Hardening by heavy construction does not provide safety in the era of accurate and reliable missile systems."⁷² SPG was drawing on its studies of the Iceworm missile system and rail- or barge-mounted missiles, which had proven to be less vulnerable delivery vehicles. These studies had shown that hardness and dispersion alone were not the solutions: "Mobility offers the only solution that exceeds any reasonable commitment of Soviet missiles. A small amount of daily movement by target elements involves excessive weapons requirements for the enemy to achieve even minimal assurance of kill."⁷³ Although the Kennedy administration had rejected the railroad-mounted missile system as too expensive, SPG continued to recommend a land-based system that would achieve the mobility, dispersion, and deception that made the Polaris submarine system the least vulnerable element of American nuclear forces.⁷⁴ Whatever the practical difficulties of implementing such a solution, the theoretical ad-

vantages of the proposed MX mobile missile system during the Carter administration were recognized in the late 1950s and clearly articulated in the early 1960s. If survivability was to be a central feature of a second-strike nuclear force, and missile technology was expected to improve, then new means of protecting the land-based missile systems had to be devised.

SPG's work in vulnerability analysis involved not only the protection of nuclear delivery systems, but also the protection of American cities. The Army had begun developing an antiballistic missile during the mid-fifties, and in the early sixties continued the research into the possibilities of building a missile that could intercept and destroy incoming ICBMs. In a study published in 1962, SPG delineated the areas in major American cities that contained most of the cities' valuable resources and were thus the areas that should be defended by an ABM system.⁷⁵ The Army's research and development agency had also asked SPG to examine "the ability of urban areas to resist nuclear weapons effects from high air bursts which will not necessarily cripple a city but will inflict some lower order of damage."⁷⁶ The purpose of the latter study was "to determine if the risk of serious damage to urban areas is low enough to permit lowering the altitude of intercept of the ABM system."⁷⁷ Using the same techniques developed earlier to study the effects of nuclear detonations on Soviet and American cities, the group outlined the damage that explosions of various-sized weapons at various altitudes would have on major American cities. Neither of these studies examined the characteristics of the ABM hardware and neither produced any recommendations on ABM feasibility.

One of the basic steps in vulnerability analysis involved determining the damage caused by the various effects of nuclear explosions. SPG continued its pioneering work on nuclear fallout in 1961 when it devised and published a simplified, manual procedure for estimating the amount and pattern of fallout dispersion.⁷⁸ As the group had pointed out in earlier studies, the primary problem was estimating wind conditions at any particular time. Using extensive wind data from the Air Force's Climatic Center, SPG devised a series of templates that could be adapted in scale and used to predict fallout patterns for a variety of weather conditions. Even this procedure was laborious when there were a large number of nuclear detonations to consider, and the study indicated that the Army was taking steps to computerize the procedure. In another study, SPG outlined a simplified manual procedure for estimating troop casualties from a nuclear attack.⁷⁹ The group devised this procedure during the *NATO Post-Attack Capabilities* study, which SPG had to complete in 30 days. Because existing procedures and data were not appropriate for such quick calculation, SPG developed a series of troop deployment models that could be used to estimate the effects of nuclear explosions on troops in the field. In both these studies, the group acknowledged that the procedures had flaws but argued that roughly accurate information that was quickly obtainable was

better than precise information that required a long time to calculate. SPG's contributions in the field of vulnerability analysis thus extended into the realm of methodology as well as into the realm of substantive studies.

Although vulnerability analysis was not new in 1961 when Kennedy came into office, the nuclear policy of the new administration focused on the problem of survivability and the steps required of the United States in order to prepare for a Soviet first strike. Its previous work in the area of strategic nuclear weapons made SPG a logical choice for examining the effects of nuclear war not only on the Soviet bloc, but also on the NATO countries, including the United States. Many of the defense policies of the Kennedy era attempted to reduce the vulnerability of the United States, and the Strategic Planning Group's extensive work during this period helped to isolate American weaknesses and find measures to remedy them.

* * *

Developments in both technology and doctrine during the 1950s had made tactical nuclear warfare a significant new military option. For Eisenhower, tactical nuclear weapons were one remedy for Warsaw Pact numerical superiority, but for Kennedy the danger of escalation to a massive strategic exchange outweighed the questionable edge that nuclear weapons might give NATO. Instead of relying on nuclear weapons, the new administration wanted to build up American and NATO ground forces in order to provide a conventional response to any Soviet aggression. However, the difficulties of obtaining an expensive NATO buildup and the European fears that the United States wanted to remove its "nuclear umbrella" meant that tactical nuclear war and weapons remained a part of American military doctrine.

Beyond these broad questions of strategy were the persistent problems of how to fight a tactical nuclear war. During the 1950s the Army and SPG had investigated this problem and, as Henry Rowen later noted, "the results were not encouraging."⁸⁰ Again in 1964, the Army undertook a major reexamination of tactical nuclear war in the Project OREGON TRAIL study, and the group produced an eight-volume study and another single volume as input into this Army effort.⁸¹ In the larger study, *Theater Operations in a Nuclear Environment* or TONE, SPG investigated the effect of a nuclear war on the communications zones (COMMZ) or the areas just behind the front lines of both sides (see figure 17).

Using the standard procedures for vulnerability analysis, TONE examined the effects of nuclear attacks on the zones and their ability to support the combat troops. As the first step, SPG conducted a series of complex war games, including detailed map studies, of various types of nuclear war. When the war games imposed no restraints on targets or weapons

AREA STUDIES IN THE TONE ANALYSES

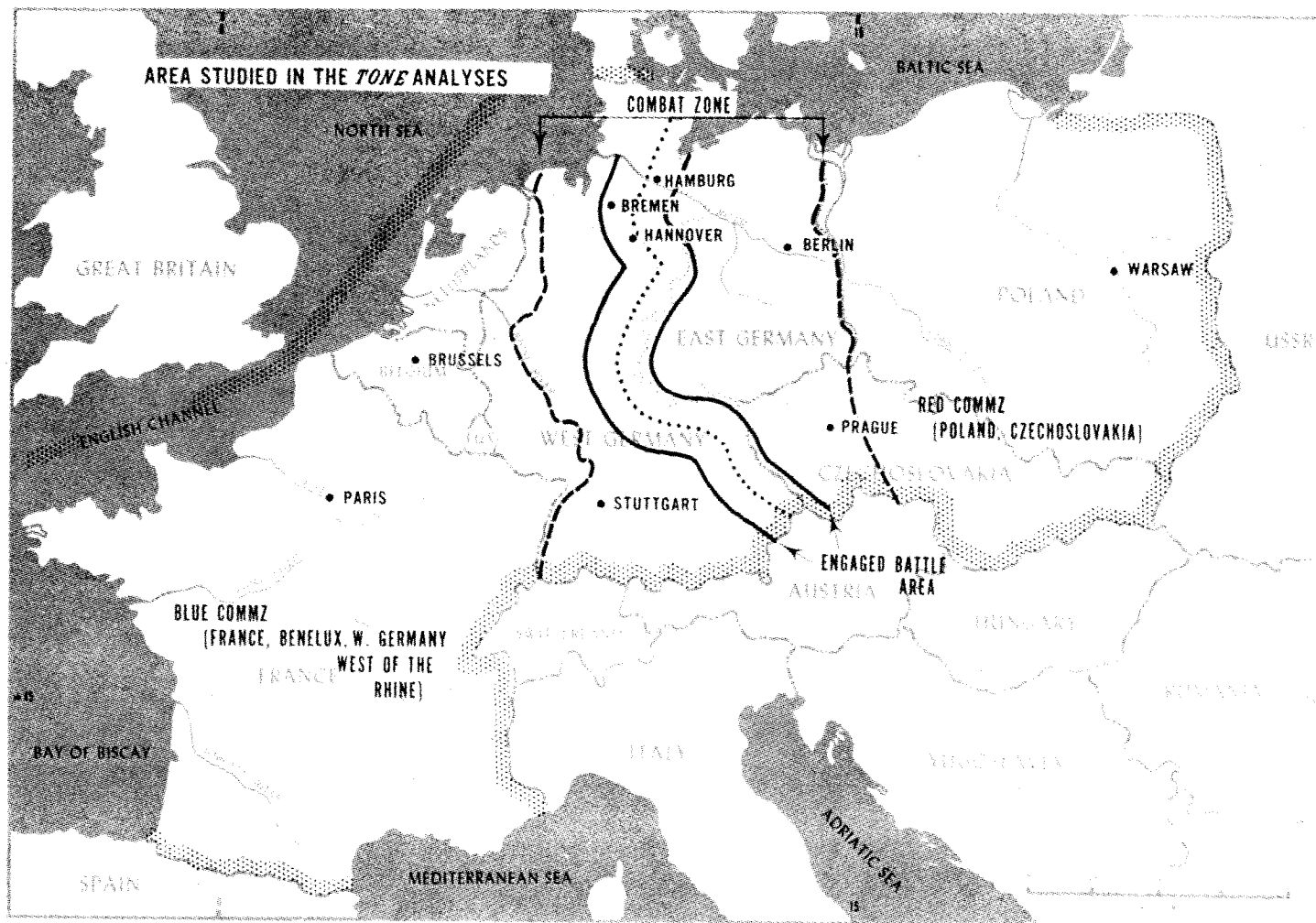


Figure 17

yields, the group found, as it had in 1958, that analyzing the situation was difficult. None of the existing support and logistical systems could cope with the fury of unconstrained nuclear war. If, however, both sides observed certain constraints, particularly those limiting weapons yields and confining attacks to clearly military targets, NATO could respond to a Soviet attack: "From the overall point of view, it is our evaluated opinion that Western Europe (and Eastern Europe, too) can absorb considerable megatonnage without a severe dislocation of its essential fabric provided that indiscriminate urban-industrial destruction is not intended and not prosecuted."⁸² Although it could survive a restrained nuclear attack and strike back, NATO still had grave weaknesses that urgently needed correction. Echoing earlier studies, SPG again urged NATO to adopt interdiction plans for the movement of Soviet troops into Central Europe and to reduce the vulnerability of its missiles and aircraft. While it appeared that NATO could fight a tactical nuclear war in Europe, the results would be delicately balanced on a series of mutually agreed upon constraints.

In a second subsidiary study for Project OREGON TRAIL, the group pointed out another NATO weakness.⁸³ Using the war games played in TONE, SPG investigated the problems of replacing the losses of men and equipment in a tactical nuclear war and concluded that these losses would be too substantial for the existing replacement system to handle. Although the personnel casualties would be high, the major problem was the loss of equipment, which would take much longer to replace than the soldiers. "The only realistic approach," SPG noted, "to minimizing this problem in the 1968-1972 time frame appears to be a combination of: (1) recovering salvable equipment, (2) prestockage [sic] of major equipment items, and (3) airlifting the remaining requirements."⁸⁴ In the years since this study, the Army has periodically increased the stockpiles of equipment destined to replace the losses expected in the first battles in Europe.

In addition to its broad studies of tactical nuclear warfare, SPG continued the work begun in the 1950s on atomic demolition munitions (ADMs). In 1961 the group updated its 1958 study on the yield requirements for ADMs and again concluded that the most useful ones were those with extremely low yields.⁸⁵ As late as 1964 SPG acknowledged, however, that ADM hardware needed to be modernized and its capabilities extended.⁸⁶ Much of the group's work on ADMs during this period involved preparing basic manuals for ADM use (see figure 18). In one Joint Atomic Weapons Planning Manual and three manuals designed for use in the field, the group carefully described the targets most appropriate for ADMs, the methods for emplacing the device in order to produce the desired damage, and the size of weapon that would be most effective.⁸⁷ In another manual, SPG developed and described a simplified (although hardly simple) method for estimating the fallout effects of an ADM.⁸⁸ In this series of studies, SPG primarily consolidated and systematized the existing technical and operational information on nuclear explosives.

TYPICAL CRATER PROFILES vs DEPTH OF BURST

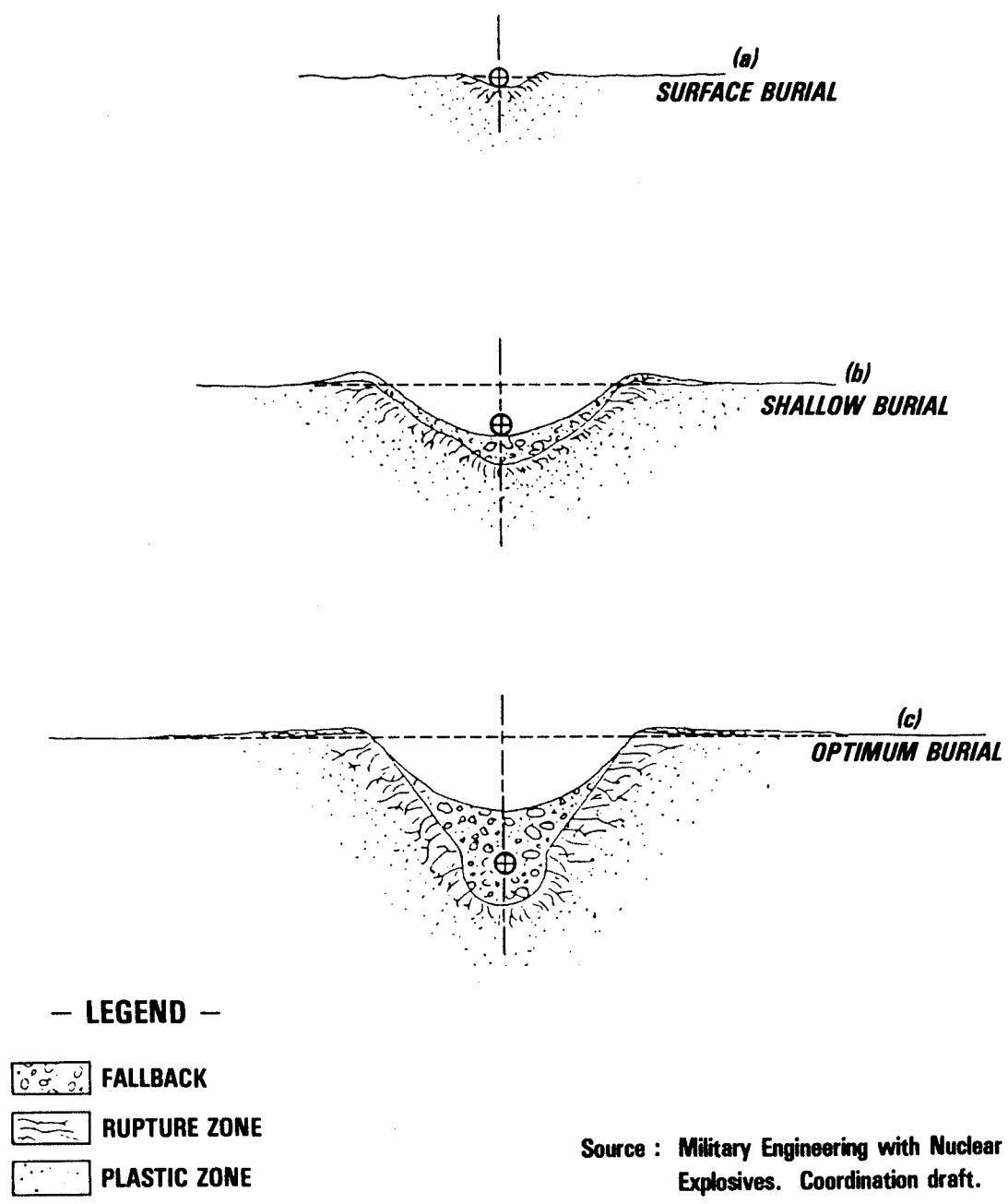


Figure 18

Another study published in 1962 also continued an SPG project begun during the Eisenhower era. In 1960 the group had recommended stationing an ICBM force in the Greenland icecap, and two years later the Iceworm concept was readapted for medium-range ballistic missiles (MRBMs) as a part of NATO's tactical nuclear capabilities.⁸⁹ The group restated its initial rationale for Iceworm, especially the advantages of coupling "mobility with dispersion, concealment, and hardness."⁹⁰ This study tried to confront more squarely the political and diplomatic problems of Iceworm, in particular the sensitive issue of Danish agreement to the project. Included in the study was a copy of a letter from Henry S. Rowen, Deputy Assistant Secretary of Defense, to Walter Rostow, chairman of the Policy Planning Council, Department of State, which indicated that Iceworm had received attention at high levels. Rostow had asked Rowen for a Defense Department evaluation of Iceworm as an MRBM concept, and Rowen replied that the idea needed fuller evaluation, although it seemed technically feasible and showed sufficient promise to warrant additional consideration. While the project was never implemented, it did receive attention as a novel and imaginative idea.

Although the SPG studies of the early 1960s concluded that NATO could fight a tactical nuclear war in Europe, some problems and difficulties still had to be overcome. Even the tactical nuclear weapon—the ADM—that had been the preserve of the Corps of Engineers since the 1950s needed modernization. If, however, the Kennedy administration had a choice, it preferred to rely less on tactical nuclear weapons and place more emphasis on conventional forces.

* * *

In its studies of nuclear weapons and their effects, SPG continued the work that it had begun in the 1950s. While atomic weapons remained an important aspect of the group's work in the early 1960s, its studies soon began to reflect the Kennedy administration's emphasis on conventional forces. The new administration wanted to expand the nation's limited war forces, but only to the extent required to protect the country's interests. Not only did McNamara ask "how much is enough," but he also wanted careful and explicit justification of the forces that the services requested. In the early 1960s, therefore, McNamara spurred the Army into an extensive study effort designed to determine what conventional war forces the United States needed and how they would be used.⁹¹ This inquiry led SPG into the new areas of force requirements and force structuring, which would become major concerns of the organization for the next decade.

The first and most massive of the general purpose forces studies was *Conventional War Forces—1967*, published in June 1962.⁹² The Annual

Historical Summary for FY 62 went into unusual detail about the origins of this study:

By far the most significant project assigned to the Strategic Planning Group during FY 62 occurred in the last quarter. On Saturday 31 March, the Chief of SPG, Colonel John C.H. Lee, Jr., was called to the Office of the Deputy Chief of Staff for Military Operations. Present were Lt. General Hamlett (Vice Chief of Staff designee), Major General Carus and Brigadier General Hutchins. General Hamlett stated that he respected the talents available at the Strategic Planning Group and that he would, on Monday 2 April, call the Chief of Engineers requesting that SPG conduct the necessary studies to develop the Army position on the subject of General Purpose Forces. General Hutchins cautioned all concerned with the sensitivity of the study and the Vice Chief of Staff indicated that the study is perhaps the most important study project currently being undertaken by the Army.⁹³

McNamara had requested a study of conventional force requirements from the Joint Chiefs of Staff, and because the subject was so important to the Army, it had commissioned SPG to examine the problem. The topic was new to the SPG, whose resources were hardly capable of completing such a large task alone. However, Colonel Lee, an aggressive and outspoken officer, convinced the Army staff that the group, based on its past record, could do the study. For almost three months, SPG virtually shut down its other activities and devoted full time, or perhaps more accurately, full overtime, to *Conventional War Forces—1967*.⁹⁴ The Annual Historical Summary indicated that the study required placing “approximately 12 field grade officers on TDY to the Strategic Planning Group in addition to another 7 officers on duty with SPG from Army elements within the Military District of Washington area. Furthermore, the study was supported by approximately 23 Research Analysis Corporation (RAC) and Stanford Research Institute (SRI) personnel working practically full time.”⁹⁵ The result was an 11-volume, 1,700-page report.

The purpose of the study was to determine the land, sea, and air forces needed to fight a series of limited, nonnuclear wars in 1967. In order to determine the forces required, SPG examined the projected international situation in 1967 and the military contingencies for which it seemed prudent to plan. The JCS study group and intelligence sources provided an assessment of the Soviet Union’s intentions and its ability to commit forces in pursuit of its goals. SPG then determined American objectives in each potential theater of operations and derived measures of the combat effectiveness of the various troops that might be used in the theater. After carefully analyzing the geographic characteristics of each theater, the group conducted war games to determine the forces the United States would need to achieve its objectives, the logistics and support requirements of these

forces, and the problems involved in mobilizing and deploying troops and supplies to fight these limited wars. Because the United States might well have to fight more than one war at a time, SPG also analyzed various possible combinations of wars in different theaters.⁹⁶ Even with the large number of people assigned to the task, it was a huge undertaking for such a short period of time.

As with many other studies, SPG had to devise and at times improvise new methodologies in order to perform the task, and Volume I of the study, entitled "Methods of Estimations," contained a careful explanation of the tools and their limitations. In 1962 both war gaming, in its modern sense, and the use of computer war games were in their infancy. RAC had developed several war game routines, and SPG used one of them to simulate a conventional war in Europe. Although computers had hastened the process, the early computer games were still slow: "Forty-three combat days were played in 14 days' working time. The same group would have required on the order of 675 working days to exercise the models manually."⁹⁷ Given the short time available, even computers were too slow, and the group had to develop several "quick gaming" techniques, which it admitted had limitations but were preferable to largely unsubstantiated guessing. Using these gaming techniques, the other ten volumes gave detailed estimates of the general purpose forces needed for a variety of military situations that could conceivably occur in 1967.

Conventional War Forces—1967 was a key factor in helping the Army establish its position with the JCS and McNamara regarding the land forces needed to fight limited wars. It was also important in establishing SPG's reputation for being able to coordinate, support, and conduct a large study effort and to present the study convincingly in a series of briefings before high-level officials of the Army and the Defense Department. According to George H. Orrell, an analyst who worked on the project, "it stretched the organization beyond its previous capabilities."⁹⁸ Based on the work performed in this study, SPG went on to do several similar ones until the estimation of force requirements became a more routine task assigned to other Army agencies.

The second aspect of general purpose forces in which SPG pioneered was force structuring. After the McNamara Defense Department had determined the overall requirements for conventional war forces, the problem of structuring these forces remained. For example, after deciding the total number of divisions that the Army required, the Defense Department still needed to determine what mix of combat (e.g., infantry and armor) and combat support (e.g., engineers and signal) troops constituted the best force.⁹⁹ McNamara's staff encountered this problem early when they tried to determine why the Soviet army was credited with having ten times as many divisions as the American Army even though it had only twice as many soldiers. One aspect of the problem was the proportion of each coun-

try's force that was composed of combat troops ("teeth") and the proportion composed of support troops ("tail").¹⁰⁰ Although the "tooth-to-tail" question was not a new one, the McNamara Defense Department demanded more detailed and explicit analyses of the problems involved in organizing the Army so that it would be an efficient fighting force.

In July 1963 the Vice Chief of Staff of the Army, General Barksdale Hamlett, asked the Assistant Chief of Staff for Force Development to "provide the Army with an up-to-date authoritative basic guide for planning the composition and development of larger forces" and directed SPG to prepare the study.¹⁰¹ Although the group had the experience of the *Conventional War Forces* study, the area of force structuring was a new one, and again the Army staff assigned a large number of personnel to assist the group in completing this study effort. SPG prepared two five-volume studies in late 1963 and early 1964. The first study was a Force Planning Guide for Europe and the second, for Southeast Asia.

Both studies developed corps-sized forces, including combat and support troops and equipment, designed to fight realistically projected wars in Europe and Southeast Asia. According to the first Force Planning Guide, its purpose was "to develop a troop planning document for theater force structuring which will serve as a guide and measuring device for other plans, studies, and programs relating to a dual-capable force fighting a general non-nuclear war in Western Europe in the 1965 time frame under conditions of austerity, practicality, and with acceptable risks."¹⁰² The group designed both studies to serve as models of force structuring: "During the study, principal emphasis was placed on the development of yardsticks and rules by which the numbers and mixes of combat, combat support, and service and service support units were determined, and on documenting these data for future reference."¹⁰³ The five volumes of each study provided detailed and comprehensive discussions of each type of unit included in the corps force and the reasons for its inclusion.

The Force Planning Guides began with detailed scenarios for wars fought in Europe and Asia. The scenarios, drawn up by the Deputy Chief of Staff for Operations (DCSOPS) and other staff agencies, specified enemy objectives, troop strengths, and plans of attacks along with the response of the United States and its allies. Out of the total American forces assigned to each theater, SPG selected a corps-sized force (approximately 150,000 to 175,000 men), analyzed its combat tasks, and then determined the units the force needed to include. In order to make the analysis manageable, the group determined the composition of the corps for one particular time (in both cases, D-Day plus 180 days). Although the corps forces would vary in composition at different times in the campaign, the studies provided enough data to allow interpolation for other time periods.

The study group carefully examined each unit in the force to determine its capabilities and the requirements for its services. One volume was

devoted to combat troops, another to support troops, and a third contained a one-page justification for each unit listed in the force.¹⁰⁴ In the logistics volume, which was very similar to the Department of the Army Strategic Logistic Studies (DA-SLs) produced in the 1950s, the group conducted a thorough examination of the troops, materiel, and equipment required to support the corps force. The objective of the guides was to pare the force to the minimum size required for the execution of its mission.

Both studies gave particular attention to the “tooth-to-tail” ratio. The first study outlined both the objective and some of the problems in force planning:

It is a constant goal of the Army and its commanders to keep at the minimum, and to reduce, if possible, the logistic and administration costs incident to supporting a given combat force. The task becomes increasingly difficult as vehicles and other materials increase in density and complexity within the field army. The degree of success attained in this planning guide or any other would be a measure of its value. Such a determination is difficult for lack of suitable measuring sticks.¹⁰⁵

In preparing the study, the group maintained that “austerity is the rule with the objective of eliminating or reducing all units of the Corps Force with only marginal effectiveness or whose contribution would not be worth the cost in men and materiel. Maximum use is made of indigenous resources within the theater to reduce to a minimum the U.S. forces required.”¹⁰⁶ In the final analysis, the studies tried to arrive at the leanest “tooth-to-tail” ratio compatible with accomplishing the force’s mission.

Application of the same methodology to two very different geographic regions, however, led to two different corps forces:

The Corps Force (Europe) study was war gamed in a highly developed area with an advanced industrial complex and wherein the host nations (France and FRG [Federal Republic of Germany]) were capable of supporting U.S. forces with a highly developed rail and road net, operating pipeline, port facilities, skilled personnel for direct hire, contract organizations, etc. The maximum utilization of host nation support minimized requirements for U.S. logistic units. On the other hand, Corps Force (Asia) was war gamed in an area almost entirely devoid of the material and personnel resources found in Europe by quantity and skill. In developing computations based on the European environment, a combat-to-combat support ratio of 60.51 to 39.49 was derived. Use of the same methodology in the Corps Force (Asia) study resulted in a combat-to-combat support ratio of 50.41 to 49.59. In this underdeveloped theater, a greater requirement for services, particularly engineer and transportation, had to be satisfied. In addition, the higher disease rate prevalent in the area generated a requirement for more hospitals, water purification

units, etc., and the complete lack of any morale facilities required the addition of a special service company. In general, the degree of support was inversely proportional to the development of the areas.¹⁰⁷

As General Haines, Assistant Chief of Staff for Force Development and sponsor of the studies, wrote in his Foreword, the corps forces were not ideal or "type" forces, but instead were "developed to meet the needs of a realistically framed hot war situation."¹⁰⁸

In addition to the overall conclusions, SPG pointed out in both studies particular problems uncovered in the course of its analysis. The longest list of problem areas appeared in the Southeast Asia study. SPG recommended further study of the need for a more maneuverable and more easily supported armored firepower vehicle. It also emphasized problems that the tropical climate could cause: "Current TOEs [Tables of Organization and Equipment] are designed for the northern zone and capability statements are generally based on performance in that environment. In areas of the world where different climatic conditions prevail, a degradation of individual capabilities is anticipated."¹⁰⁹ Climatic conditions also made calculation of artillery support difficult because the existing studies on this topic were geared for Europe. Finally, the group concluded that "in the more difficult segments of the Southeast Asian environment, despite maximum feasible use of aircraft, considerable road construction, maintenance, and improvement effort were necessary."¹¹⁰ The Force Planning Guide was one of several studies in the early 1960s in which SPG discussed the difficulties involved in the Southeast Asian environment.

Both the general conclusions and the specific recommendations made the Force Planning Guides a landmark in SPG's history, and they also signaled an important evolution in the history of the Army. For SPG, the Force Planning Guides and *Conventional War Forces—1967* began a long period of concern with the problems of determining the size and structure of American limited war forces. For the Army, as General Haines noted, the Force Planning Guides were intended to "produce a quantum improvement in the soundness of Department of the Army force development programs and actions."¹¹¹ The very call for soundness in planning for the expansion and development of conventional forces marked the end of the Army's eclipse under the Eisenhower administration and a resurgence of interest in the role of land forces in the national military effort.

* * *

Although force requirements and force planning were the two major new areas of SPG studies during the early 1960s, there were other new areas that later became significant concerns of the organization. Studies of the stationing of Army units and the effectiveness of new military technology would be conducted throughout the next two decades of the group's

history, and the study of management problems would become by the 1970s one of the major preoccupations of the organization. All three areas appeared in at least embryonic form during this period.

Finding tracts of land suitable for stationing large units of the Army was a persistent problem, but it became more acute with the expansion of military forces in the early McNamara years. Division-sized units required substantial amounts of land suitable for artillery ranges and large-scale practice maneuvers.¹¹² In January 1963, SPG published two studies that drew together “under one cover, proposed stationing requirements for division-sized Army units and analyses of the currently available DOD-owned, major real estate tracts which possibly could support such units.”¹¹³ The studies examined not only the criteria of tract size, but also climate, proximity to urban centers, vulnerability to attack, and the cost of renovation, relocation, and real estate acquisition.¹¹⁴ Like the Force Planning Guides, these documents served as guides in long-range Army planning.

Later in 1953, SPG studied a problem closer to the heart of the Engineers—the possible relocation of the Engineer School and the Engineer Center away from their long-time home at Fort Belvoir.¹¹⁵ Using the same techniques developed in the stationing studies, the group examined other possible locations and decided that in spite of crowded conditions at Fort Belvoir the Engineer activities should stay there, because it was the “home of the Engineers.” Not surprisingly, perhaps, the Chief of Engineers, General Wilson, heartily concurred in this recommendation.¹¹⁶

The first major SPG analysis of the operational effectiveness of new technological developments examined the proposed nuclear-powered energy depot system. The new system was designed to replace petroleum with nuclear energy: “The energy depot would be an easily transported fuel production system which uses a mobile reactor as its source of energy. Nuclear energy released in the reactor would be converted within the depot to some new, easily stored and transported form of fuel. In effect, the energy depot would serve as a logistically independent fuel refinery and service station.”¹¹⁷ The concept was potentially a revolutionary development in Army logistics and operations (see figure 19).

Although early studies by General Motors and Allis Chalmers had shown that the system was technically feasible, the Army had not studied its operational feasibility and usefulness. Before spending additional money on technical development, the Army Office of Research and Development asked SPG to conduct an operational study. Because no comprehensive study of Army energy requirements had ever been done, the study was a landmark effort both in its conclusions and its methodology.¹¹⁸

As the first step in a realistic appraisal of the system, the study developed or used six war plans for a variety of Army campaigns, including

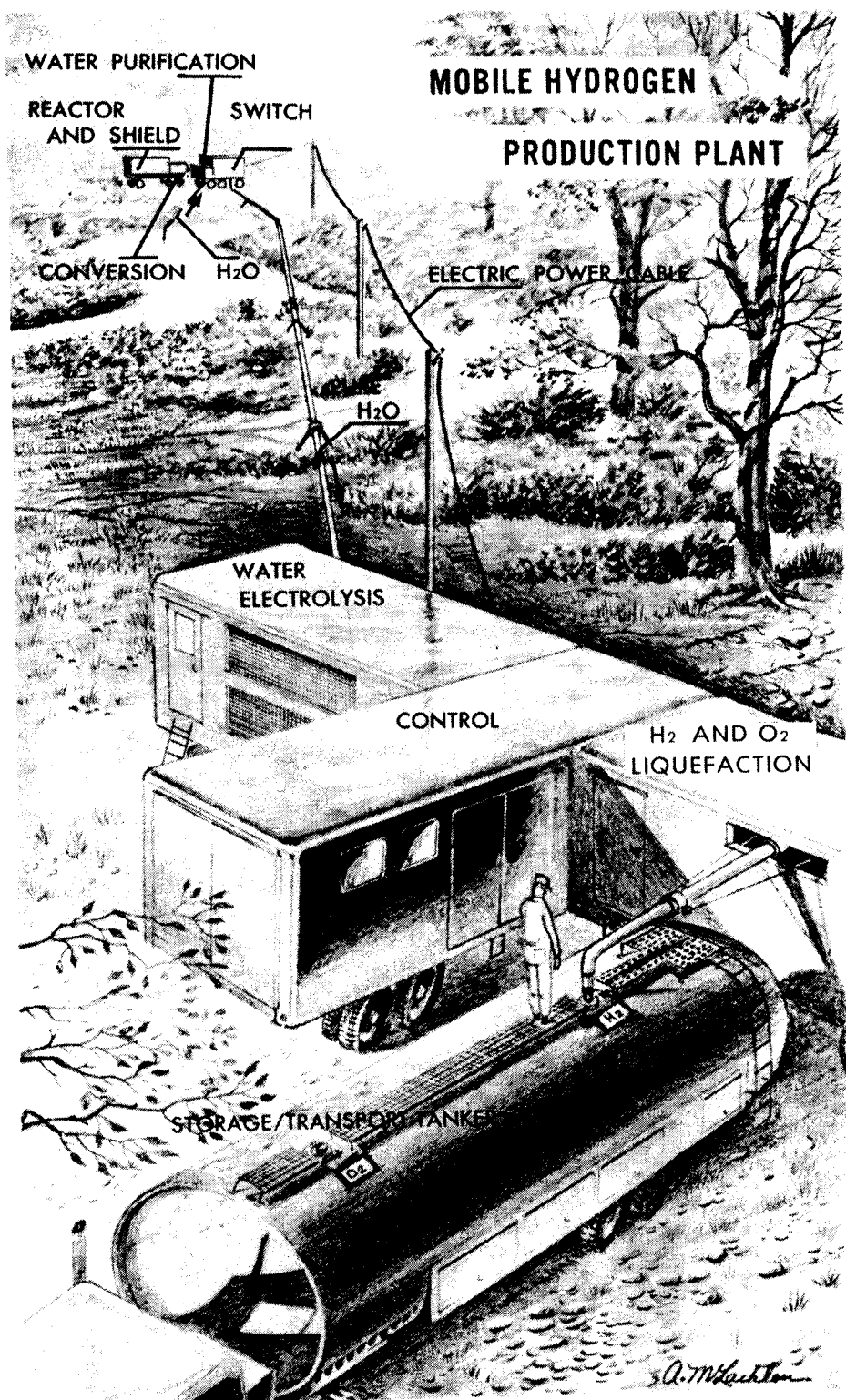


Figure 19

a large-scale war in Europe and smaller operations by division-sized forces. For each campaign, the study then isolated the various users of Army petroleum, ranging from aircraft to kitchens, and the amounts of energy that they would need. In order to test the energy depot system against petroleum, the analysts developed equivalent factors that could compare a unit of petroleum energy with a unit of depot energy. After developing these factors for the first time, the study compared three of the most technically advanced energy depot models with the conventional petroleum system. The results of these complex calculations allowed an estimation of the operational feasibility of the energy depot system.

In theory, at least, the depot system was very attractive. If some simple, efficient energy sources were available, Army units could maneuver more rapidly on the battlefield, and the bulky logistical tail that heavy consumption of petroleum entailed could be radically reduced. In a prescient conclusion, the study warned that “in a third world war, the Free World may not be able to supply its petroleum needs. This is particularly true if access to Middle East oil is lost.”¹¹⁹ Although the depots were technically feasible, the study concluded that there were still too many problems to warrant a large investment in the system, even though private corporations lobbied for this investment. The fuel cells for the system were too bulky and inefficient, thus the process of transferring the energy from the nuclear reactors to the users in the field required a great deal more technical development.¹²⁰ Although the study projected that the energy depot system had possibilities “in the very long range period,” it recommended much more study and development before the Army put large amounts of money into the project.¹²¹ The study received a research and development award—an award unusual because it was given for *not* recommending or developing a new technology.¹²² While SPG was rarely involved in research and development, this study served as a basis for several other investigations of operational feasibility.

Although SPG produced only two studies in management analysis in the early 1960s, this field would become increasingly important in the organization's history. Both of these studies, entitled *Chief of Engineers Objectives Guides*, projected the roles and missions of the Corps of Engineers for the next 15 years and the actions that the Chief and the Corps would have to take in order to fulfill them.¹²³ In his study directive, General Wilson asked SPG to “study each mission of the Corps of Engineers as it pertains today and project the Engineer capabilities required to support the DA [Department of the Army] long range (15 years) objectives of the Corps of Engineers.”¹²⁴ The major reorganization of the Army that had taken place in 1962 drastically changed the role and functions of the technical services which survived, and the Chief turned to SPG for a thorough evaluation of the Corps' new missions and capabilities. The topics examined ranged from officer shortages to equipment deficiencies; from mapping and

intelligence to civil defense. The McNamara reorganization had stunned all the old technical services; now the Chief of Engineers wanted to plan the future of the Corps as carefully as possible.

* * *

While the early 1960s had witnessed the development of new and important areas, the group continued its logistics and military engineering studies, which had been staples of the organization since its inception. In 1961, SPG completed its last formal DA-SL. While DA-SLs had formed the bulk of the group's logistics studies in the 1950s, responsibility for this work now passed to the office of the Deputy Chief of Staff for Logistics (DCSLOG), where new computerized procedures were replacing the old manual techniques.¹²⁵ SPG, however, continued to use the DA-SL procedures in other studies, including the Force Planning Guides and a series of four studies on logistics problems in potential East Asian theaters. This series began in late 1962 when the Secretary of Defense ordered a study of the logistical feasibility of the Commander in Chief, Pacific's (CINCPAC's) war plan for potential operations in Southeast Asia.¹²⁶ Because the results of this study were disquieting, DCSLOG asked for two further evaluations of the plans for the Army commander in the Pacific.¹²⁷ A separate document in October 1963 summarized all three studies.¹²⁸

In the first study, SPG had judged that a plan for a campaign in Southeast Asia was infeasible because it underestimated the logistics support that the operation would require. The study warned, as did the later Force Planning Guide, that the environment of Southeast Asia would place "unusually difficult burdens on combat support and logistic support operations."¹²⁹ The study cited as potential problems the limited road and railroad networks in the area, the inadequate base facilities, the lack of an adequately skilled and equipped indigenous work force, and the vulnerability of facilities to guerrilla attacks. Because the first study had discovered serious logistics problems, DCSLOG asked for a closer examination of Army supplies and equipment that had been authorized as reserves to be used in the Southeast Asian theater in case of war. Again SPG found inadequacies based largely on the lack of a sufficient capacity to airlift supplies from the United States to the theater and within the theater itself.¹³⁰ SPG then completed the evaluation of theater reserves by examining the adequacy of Army supplies for a war in Korea that might well accompany any major operations in Southeast Asia. Again the picture was bleak.¹³¹

In the summary study, SPG concluded that the major problems with the war plans resulted from the "rapid introduction of tactical forces into the objective areas."¹³² This rapid troop buildup caused two problems: "reserves are quickly drawn down and shortages in available airlift capacity develop."¹³³ In the group's opinion, "the only feasible solution to these problems appears to be the prepositioning of the initial requirements in or

near the objective areas.”¹³⁴ SPG again recommended, as it had done in the NATO vulnerability study, the prepositioning of supplies and equipment in a potential theater of operations—an idea that would become an important concept in Army logistics planning.

In late 1964, SPG completed an even more comprehensive evaluation of the “logistic capability to support operations in Southeast Asia” for DCSLOG.¹³⁵ This three-volume study examined a variety of campaign plans for forces of various sizes and concluded that the “lack of sufficient combat service support troop units is the critical constraint.”¹³⁶ Although different problems developed in different scenarios, the most serious ones arose, once again, as the result of the rapid introduction of a large combat force into the area.

Two other studies illustrated the scope and range of SPG’s logistical studies. In July 1963, the group published a study of the Soviet Union’s ability to reinforce and resupply its troops in Central Europe in case of war.¹³⁷ The study determined the capacity of rail, highway, and water transportation in Poland, Czechoslovakia, and East Germany and then calculated the numbers of troops and supplies that could be transported from the Soviet Union to the front. During the next year, SPG examined the wartime petroleum distribution system of the Army based on the requirements generated by the existing war plans.¹³⁸ From these projected requirements, the study estimated the total amount of materiel and equipment that would be needed and compared these estimates with the existing inventory of supplies. In its conclusions, the study identified deficiencies and excesses and recommended remedies.

Another area of continuity in SPG studies was barrier and denial planning. The group had helped revive barrier planning in the early 1950s as a method for defending Western Europe from superior Warsaw Pact forces. In the ensuing decade, however, military conditions in Europe changed, and in 1962 a JCS Special Study Group called on SPG to draw up a new set of barrier plans for West Germany. This study devised a fortified barrier system that was “a series of barrier obstacles related to terrain reinforced by some positions which are stronger (concrete, steel, etc.).”¹³⁹ The study warned that fortifications had certain liabilities such as costly construction and maintenance and cautioned that forts could restrict friendly maneuver just as much as they restricted the enemy. In the tradition of its earlier studies, SPG examined the terrain, plotted a series of barrier lines, estimated all the equipment materiel necessary to construct them, and calculated the costs (see figure 20). Two years later the group prepared another such study that included changes necessitated by revised war plans for Europe.¹⁴⁰ Both of these studies were substantial undertakings, but this study effort had now become a standard part of SPG’s repertoire.

Although the group continued to believe in the value of barrier plan-

ning, by 1964 it had serious reservations about the ability of the Army to use these defensive measures effectively:

Currently available materiel for conducting barrier and denial operations is completely out of tune with modern and advanced concepts of operations. The situation is more critical in Europe and Korea where the shortfall is further aggravated by the low ratio of engineer troops in these commands in proportion to the task. Lack of present capability for rapid construction of conventional barriers to limit enemy mobility is one of the most serious Army shortfalls.¹⁴¹

Barrier planning, like other areas of military engineering, depended on both adequate materiel and sufficient numbers of troops.

In a study published in 1961, SPG examined the availability of Engineer troop units to meet the requirements of the war plans drawn up by the various Unified and Specified Commanders and by the group itself.¹⁴² Although sufficient Engineer units were available in the active Army and the reserves, the study foresaw potential problems in mobilizing, training, transporting, and deploying the troops in the time required. "It is entirely possible," SPG acknowledged, "that an aggressive enemy could overrun a friendly country before this could be accomplished."¹⁴³

In addition to its studies of personnel problems, SPG also examined Engineer construction and damage repair capabilities. In 1962 the organization, as it had done in 1958, examined the possibility of constructing a new canal in Panama.¹⁴⁴ In response to a question from the Air Force, the group concluded that Engineers could not repair airfields in Europe that had come under enemy attack as quickly as the Air Force had estimated.¹⁴⁵ In the 1970s and early 1980s, SPG's successors conducted several studies of the vulnerability of airfields in Europe and Korea and the techniques for repairing wartime damage.

One of the major SPG activities in the field of logistics and military engineering continued to be the Engineer Functional Components System (EFCS). Although the last of the three manuals describing the system had been published in 1960, the group continued to revise and update the EFCS. Certain facilities still had not been included, and while contractors did most of the engineering work, members of SPG provided some of the newer, more advanced designs such as those for permanent and semi-permanent military bridging.¹⁴⁶ Not only did the group supervise and evaluate the contractors' designs for new facilities, but it also made sure that the Army could obtain the hundreds of individual items that a facility required. Although many of the items were already in the Army supply system or readily obtainable, SPG identified items that might be scarce in an emergency and recommended appropriate stockpiles.¹⁴⁷

By 1964 the EFCS was still not quite complete for the temperate climate zone and work had not yet begun on the tropical or frigid zones. SPG had placed its data on computer tapes, and the information was read-

ily available to planners. However, the primary user of the system was SPG, because the EFCS was still not well known throughout the Army in spite of the group's efforts to publicize it. Funds allocated to the system steadily decreased until the experiences in Vietnam revealed both the weaknesses of EFCS and the need for such a system.¹⁴⁸

While SPG still devoted most of its time and energy to larger studies and projects, the group continued to receive requests for "quick-reaction" analyses of problems that required immediate attention. The most dramatic of these came at the time of the Cuban missile crisis in 1962.¹⁴⁹ During the period when President Kennedy and his advisors were evaluating courses of action to remove the Soviet missiles, SPG was asked to do several quick studies of certain logistical problems that might arise during an invasion of Cuba. Later, as the Vietnam conflict intensified, the group did many more of these quick response analyses. However, in the early 1960s SPG usually avoided staff action problems and concentrated on those that required more thorough and long-range analysis.

Although SPG no longer did the DA-SLs that had absorbed much of its energy in the 1950s, work in logistics and military engineering remained an important function of the organization. Ever since World War II, the group had been concerned with the logistical and engineering requirements for war plans. In the early 1960s this planning became a part of larger efforts like the Force Planning Guides, or was the subject of separate specific studies like those for Southeast Asia or Europe. Although other areas of study fluctuated, military engineering and logistics remained constant themes in SPG's history.

* * *

The early 1960s were years of intense activity for the Strategic Planning Group. Although the Kennedy administration wanted to deemphasize the role of nuclear weapons, they remained an important part of America's defense arsenal. As the world situation and American strategy changed, the Defense Department had to revise and rethink nuclear policy continually. Both the administration and agencies like SPG struggled to develop policies and plans that could deal with the inconceivable—nuclear war. At times the SPG was out of step with the new administration and at times it was ahead of both the doctrine and technology of the day. In all its efforts, the group strove to make nuclear war unlikely, but, if it should occur in all its horrors, to make it an instrument of policy and not an irrational, uncontrolled cataclysm.

While the Kennedy-McNamara leadership felt that nuclear war was an eventuality that had to be considered, it placed greater emphasis on conventional forces. The Army and SPG worked in the early 1960s to define the task of the general purpose forces and determine the size and character of

the forces needed to counter the Soviet threat. None of these were easy questions. In fact they were much harder to answer satisfactorily than was often the case with the logical and mathematical, although abstract, answers to the questions posed by strategic nuclear war. In spite of the difficulties, SPG continued to study the conventional war problems that faced the newly important Army. These problems ranged from the number of divisions the Army needed to the number of heavy construction battalions required by the Corps of Engineers. The new role for the Army envisioned by the Kennedy administration brought new issues of concern to the Strategic Planning Group. From the military engineering, logistics, and barrier planning studies of the 1950s, the group began to range into the broad areas of force requirements, force structuring, army stationing, and management analysis. As its concern with nuclear weapons waned in the late 1960s, the group delved more deeply into the many and often difficult problems raised by the new emphasis on conventional forces and the expanding war in Southeast Asia. The early 1960s saw SPG investigating a wide range of defense issues—a range which demonstrated that the group could tackle problems from many segments of the spectrum of military issues facing the United States.

Notes for Chapter IV

1. For more extended discussions of the evolution of strategic thought in the 1950s and early 1960s, see John Baylis, Ken Booth, John Garnett, and Phil Williams, *Contemporary Strategy: Theory and Policies* (New York: Holmes and Meier Publishers, 1975); Bernard Brodie, "Technology, Politics and Strategy," in Institute for Strategic Studies, *Problems of Modern Strategy* (New York: Praeger, 1970); Hedley Bull, "Strategic Studies and Its Critics," *World Politics* 20 (July 1968): 593–605; Harry L. Coles, "Strategic Studies Since 1945: The Era of Overthink," *Military Review* 53 (Apr. 1973): 3–16; and Michael Howard, *Studies in War and Peace* (New York: Viking Press, 1971).

2. Albert Wohlstetter, "The Delicate Balance of Terror," *Foreign Affairs* 37 (Jan. 1959): 211–234. See also Michael Mandelbaum, *The Nuclear Question: The United States and Nuclear Weapons, 1946–1976* (New York: Cambridge Univ. Press, 1979), p. 76.

3. William W. Kaufmann, *The McNamara Strategy* (New York: Harper and Row, 1964); Jerome H. Kahan, *Security in the Nuclear Age: Developing U.S. Strategic Arms Policy* (Washington, DC: Brookings Institution, 1975), pp. 62–77; and George H. Quester, *Nuclear Diplomacy: The First Twenty-Five Years* (New York: Dunellen, 1970), pp. 207–228.

4. Maxwell D. Taylor, *Swords and Plowshares* (New York: W.W. Norton, 1972). For general discussions of the doctrine of limited war, see

Robert E. Osgood, "The Post-War Strategy of Limited War: Before, During and After Vietnam," in Laurence Martin, ed., *Strategic Thought in the Nuclear Age* (Baltimore, MD: Johns Hopkins Univ. Press, 1979); and Robert E. Osgood, "The Reappraisal of Limited War," in *Problems of Modern Strategy*, pp. 92–120.

5. Robert W. Coakley, "The Army Since Unification: An Old Institution in a New Environment," in Paul R. Schratz, ed., *Evolution of the American Military Establishment Since World War II* (Lexington, VA: George C. Marshall Research Foundation, 1977), pp. 37–49.

6. Kaufmann, *McNamara Strategy*, p. 49–52; Maxwell D. Taylor, *The Uncertain Trumpet* (New York: Harper and Brothers, 1959), p. 108; and Bernard Brodie, "The McNamara Phenomenon," *World Politics* 17 (July 1965): 672–686.

7. Kaufmann, *McNamara Strategy*, pp. 47–101.

8. ESC, *The Dilemma of the Corps of Engineers on the New Frontier*, Unnumbered (Summer 1961), p. 1.

9. *Ibid.*, pp. 6–7.

10. *Ibid.*, p. 30.

11. James E. Hewes, Jr., *From Root to McNamara: Army Organization and Administration, 1900–1963* (Washington, DC: Government Printing Office, 1975), pp. 316–365.

12. An interview with Lt. Gen. Walter K. Wilson, Jr., conducted by Dr. Paul K. Walker for the Historical Division, OCE, Mobile, AL, 4, 5, 6 Jan. 1978.

13. *Ibid.*

14. Alain C. Enthoven and K. Wayne Smith, *How Much Is Enough? Shaping the Defense Program, 1961–1969* (New York: Harper and Row, 1971), p. 62.

15. *Ibid.*, pp. 61–62.

16. E.S. Quade, ed., *Analysis for Military Decisions* (New York: American Elsevier Publ. Co., 1970); and E.S. Quade and W.I. Boucher, eds., *Systems Analysis and Policy Planning: Applications in Defense* (New York: American Elsevier Publ. Co., 1968).

17. Interviews with Maj. Gen. Bennett L. Lewis, USA (Ret.), Washington, DC, 19 May 1981; and Col. Stanley W. Dziuban, USA (Ret.), Dana Point, CA, 15 June 1981.

18. Enthoven and Smith, *How Much Is Enough?*, p. 35; and Kaufmann, *McNamara Strategy*, pp. 168–203.

19. Kaufmann, *McNamara Strategy*, pp. 114–121; Desmond Ball, *Politics and Force Levels: The Strategic Missile Program of the Kennedy Administration* (Berkeley, CA: Univ. of California Press, 1980), pp. 88–104, 138–139, and 196–198; and Edgar M. Bottome, *The Missile Gap: A Study of the Formulation of Military and Political Policy* (Rutherford, NJ: Fairleigh Dickinson Univ. Press, 1971).

20. Enthoven and Smith, *How Much Is Enough?*, pp. 166–195; and Ball, *Politics and Force Levels*, pp. 198–205.

21. ESC, *General War Strategy and Posture*, no. 70 (May 1961). For a discussion of the broad study effort going on throughout the Defense Department in the summer of 1961, see Ball, *Politics and Force Levels*, pp. 128–132 and 189–192.

22. ESC, *General War Strategy and Posture*, p. 1.

23. Ibid.

24. Ibid.

25. Ibid.

26. Ibid., p. 26.

27. Ball, *Politics and Force Levels*, pp. 62, 67–68, 81–82, and 189.

28. ESC, *General War Strategy and Posture*, p. 26.

29. Ibid., p. 22.

30. ESC, *Briefing: The ICBM Duel*, no. 60 (Aug. 1960).

31. ESC, *General War Strategy and Posture*.

32. Ibid., p. 26.

33. Ibid., p. 27.

34. Ibid., p. 28. Compare SPG's controlled initiative strategy with the controlled response strategy articulated by McNamara in the spring of 1961. Ball, *Politics and Force Levels*, pp. 32, 189, and 193–194.

35. ESC, *General War Strategy and Posture*, p. 6.

36. Ibid., p. 29.

37. Ibid., p. 38.

38. Ibid., p. 33.

39. Ibid., p. 29.

40. ESC, *NATO Interdiction*, no. 68 (Apr. 1961); and ESC, *Soviet Army Survival*, no. 65 (Nov. 1961). See also the interview with John J. Taylor, Washington, DC, 18 July 1980.

41. ESC, *Soviet Army Survival*.

42. Ibid.

43. ESC, *NATO Interdiction*, p. 27.

44. ESC, *Army Strategic Target Study*, no. 101 (Feb. 1963); and ESC, *Strategic Retardation of the Soviet Army*, no. 90 (Apr. 1963).

45. ESC, *Strategic Retardation of the Soviet Army*.

46. Interviews with Col. Dziuban, Mr. Taylor, and Gen. Lewis.

47. ESC, *SIOP-64 and SACEUR Constraint Policy*, no. 108 (July 1964); and ESC, *SIOP-64 and SACEUR Constraint Policy*, no. 109 (July 1964).

48. ESC, *Review of Proposed Advanced Manned Strategic Bomber Capabilities*, no. 110 (Aug. 1964), p. 35. See also the interview with Mr. Taylor.

49. ESC, *A Suggested Solution to the Problem of Flashblindness to SACEUR Aircraft Crews*, no. 106 (10 July 1964).

50. Henry S. Rowen, "The Evolution of Strategic Nuclear Doctrine," in Laurence Martin, ed., *Strategic Thought in the Nuclear Age*, p. 135. For an interesting discussion of the interaction of doctrine and technology, see Bernard Brodie, "Technological Change, Strategic Doctrine, and Political Outcomes," in Klaus Knorr, ed., *Historical Dimensions of National Security Problems* (Lawrence, KS: Univ. Press of Kansas, 1976).

51. Rowen, "The Evolution of Strategic Nuclear Doctrine," p. 155.

52. ESC, *What Kills a City? (An Evaluation of Criteria in DGZ Selection)*, no. 64 (May 1961), p. iii.

53. Ibid.

54. Ibid., p. 17.

55. ESC, *NATO Post-Attack Capabilities—1967*, no. 80 (Aug. 1962), p. 1. See also the interviews with Leon Albin, Washington, DC, 9 Feb. 1981; and Mr. Taylor.

56. ESC, *NATO Post-Attack Capabilities—1967*.

57. Ibid.

58. Ibid., p. 68.

59. Ibid.

60. Ibid., p. 2.

61. ESC, *Post-Attack Mobilization of the U.S. Army—1963*, no. 67 (July 1961), 1: i.

62. Annual Historical Summary, FY 61, ESC Historical Files.

63. ESC, *Post-Attack Mobilization of the U.S. Army*, 1: 20.

64. Ibid., p. 1.

65. Ibid., p. 19.

66. Ibid., p. 25.

67. Ibid., p. viii.

68. Ibid., p. vii.

69. ESC, *NATO Post-Attack Capabilities—1967*.

70. ESC, *H-Hour Survival of Sergeant and Pershing Missile Units in Europe*, no. 82 (May 1962).

71. ESC, *NATO Post-Attack Capabilities—1967*, p. 77.

72. Ibid., p. 83.

73. ESC, *H-Hour Survival of Sergeant and Pershing Missile Units*, Annex B, p. 29.

74. Ball, *Politics and Force Levels*, pp. 110, 123–124, and 137.

75. ESC, *Population Industry Iso—Damage Contours for Selected United States Cities*, no. 78 (Oct. 1962).

76. ESC, *Urban Survivability from High Air Bursts*, no. 86 (July 1963), p. i.

77. Ibid. See also the interview with Col. Dziuban.

78. ESC, *A Manual Procedure for Determining Expected Fallout Dose in CONUS*, no. 69 (Jan. 1961).

79. ESC, *A Simple Method for Estimating Troop Casualties Resulting*

from a Nuclear Attack and the Residual Combat Effectiveness of the Force Attacked, no. 76 (Dec. 1962).

80. Rowen, "The Evolution of Strategic Nuclear Doctrine," p. 142.

81. ESC, *Theater Operations in a Nuclear Environment (Europe) 1968–1972—Substudy of Project OREGON TRAIL*, no. 105 (Sept. 1964); and ESC, *Theater Replacements in Nuclear War (1968–1972)—A Substudy of Project OREGON TRAIL*, no. 104 (Dec. 1964).

82. ESC, *Theater Operations in a Nuclear Environment*, p. 62.

83. ESC, *Theater Replacements in Nuclear War*.

84. *Ibid.*, p. v.

85. ESC, *Analysis of Yield Distribution for Tactical Atomic Demolitions*, no. 74 (Nov. 1961).

86. ESC, *Chief of Engineers Objective Guide 1964–1979*, no. 119 (Sept. 1964), p. 76; ESC, *A Guide for the Use of Nuclear Explosives in Bridge Demolitions*, no. 115 (Mar. 1964), p. 1; and interview with Robert B. Bockting, Washington, DC, 5 Feb. 1981.

87. ESC, *Joint Atomic Weapons Planning Manual (JAWPM) Ground Warfare—Atomic Demolition Munitions (ADMs)*, no. 81 (Apr. 1962).

88. ESC, *A Guide for Early Fallout Prediction*, no. 97 (Aug. 1963). See also the interview with Col. Dziuban.

89. ESC, *Deployment of NATO MRBMs in the Greenland Icecap (The U.S. Army's Iceworm Concept)*, no. 84 (June 1962).

90. *Ibid.*, p. 4.

91. William W. Kaufmann, *Planning Conventional Forces, 1950–1980* (Washington, DC: Brookings Institution, 1982), pp. 4–5; and Enthoven and Smith, *How Much Is Enough?*, pp. 210–216.

92. ESC, *Conventional War Forces—1967*, no. 85 (June 1962).

93. Annual Historical Summary, FY 62, ESC Historical Files.

94. Interviews with George H. Orrell, Washington, DC, 8 July 1981; and Gen. Lewis.

95. Annual Historical Summary, FY 62, ESC Historical Files.

96. ESC, *Conventional War Forces—1967*, vol. 1. See also Kaufmann, *Planning Conventional Forces*, pp. 5–9.

97. *Ibid.*, p. 25.

98. Interview with Mr. Orrell.

99. *Ibid.* See also the interviews with Mr. Albin and Col. Dziuban.

100. Interview with Mr. Bockting; and Enthoven and Smith, *How Much Is Enough?*, pp. 132–142.

101. ESC, *Force Planning Guide, Europe*, no. 98 (Sept. 1963), 1: Annex A.

102. *Ibid.*, p. 1.

103. *Ibid.*, p. 2.

104. *Ibid.*, 3: 1.

105. *Ibid.*, 1: 26.

106. Ibid., 2: 4.
107. ESC, *Force Planning Guide, Southeast Asia*, no. 116 (Feb. 1964), 1: 35.
108. ESC, *Force Planning Guide, Europe*, 1: v.
109. ESC, *Force Planning Guide, Southeast Asia*, 1: 39.
110. Ibid., pp. 38 and 42.
111. ESC, *Force Planning Guide, Europe*, 1: v.
112. Interview with Col. Dziuban.
113. ESC, *Preliminary Analysis for Army Division-Sized Posts*, no. 94 (Jan. 1963), p. v.
114. Ibid.
115. ESC, *An Investigation of Candidate Posts for the Engineer School*, no. 95 (Oct. 1963); and ESC, *An Investigation as to the Desirability of Relocating the Engineer Center*, no. 96 (Dec. 1963).
116. Covering letter from Lt. Gen. Walter K. Wilson, Jr., attached to ESC, *An Investigation as to the Desirability of Relocating the Engineer Center*.
117. ESC, *An Operational Analysis of Nuclear-Powered Energy Depot Systems for the Army: A Potential Revolution in Fuel Logistics*, no. 111 (Feb. 1964).
118. Interview with Mr. Orrell.
119. ESC, *An Operational Analysis of Nuclear-Powered Energy Depot Systems*, p. 28.
120. Interview with Mr. Orrell.
121. ESC, *An Operational Analysis of Nuclear-Powered Energy Depot Systems*, p. 29; and interview with Col. Dziuban.
122. Interview with Mr. Orrell.
123. ESC, *Chief of Engineers Objective Guide 1963-1978*, no. 100 (Apr. 1963); and ESC, *Chief of Engineers Objective Guide 1964-1979*, no. 119 (Sept. 1964).
124. ESC, *Chief of Engineers Objective Guide 1963-1978*, Annex B.
125. ESC, *Department of the Army Strategic Logistic Study DA-SL 11 (66-L): Engineer Annex to Volume II*, no. 71 (Aug. 1961); and interview with Mr. Bockting.
126. ESC, *Report on Logistic Support of CINCPAC Operation Plan 32-63*, no. 77 (Dec. 1962).
127. ESC, *Evaluation of the Adequacy of Authorized Theater Reserve Levels in USARPAC*, no. 99 (Mar. 1963); and ESC, *A Report on the Adequacy of Theater Supply Levels to Support USARPAC OPLAN 27-63*, no. 93 (Oct. 1963).
128. ESC, *Summary Evaluation of the Adequacy of Authorized Theater Reserve Levels in USARPAC*, no. 88 (Oct. 1963).
129. ESC, *Report on Logistic Support of CINCPAC Operation Plan 32-63*, p. 11.

130. ESC, *Evaluation of the Adequacy of Authorized Theater Reserve Levels in USARPAC*.
131. ESC, *A Report on the Adequacy of Theater Supply Levels to Support USARPAC OPLAN 27-63*.
132. ESC, *Summary Evaluation of the Adequacy of Authorized Theater Reserve Levels in USARPAC*, p. 10.
133. Ibid.
134. Ibid., pp. 12-14.
135. ESC, *Logistic Capabilities to Support Operations in Southeast Asia (Spring 1965)*, no. 112 (Dec. 1964).
136. Ibid., p. 47.
137. ESC, *Soviet Bloc Reinforcement and Resupply in Central Europe*, no. 91 (July 1963).
138. ESC, *Army Objectives for Support of Petroleum Distribution Operations. A Strategic Analysis of Actual and Potential Capabilities*, no. 120 (July 1964).
139. ESC, *Effect of Fortified Barrier Systems on Force Requirements in Central Europe*, no. 83 (Oct. 1962), p. C-3.
140. ESC, *USAREUR Optimum Barrier Study*, no. 103 (Sept. 1964).
141. ESC, *Chief of Engineers Objective Guide 1964-1979*, p. 15.
142. ESC, *Availability of Corps of Engineers Troop Units to Meet Contingency War Plan Requirements*, no. 72 (Oct. 1961).
143. Ibid.
144. ESC, *Organization for Construction and Operation of a New Isthmian Canal*, no. 79 (Jan. 1962).
145. ESC, *Emergency Runway Repair Capability for USAF TAC Airfields*, Unnumbered (1962).
146. Interview with Mr. Orrell.
147. Interviews with Mr. Orrell and Mr. Albin.
148. Ibid.; and the Annual Historical Summary, FY 61 through FY 64, ESC Historical Files.
149. Interview with Mr. Orrell.

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